Sunspot Cycles and the Drought of 2001-2002

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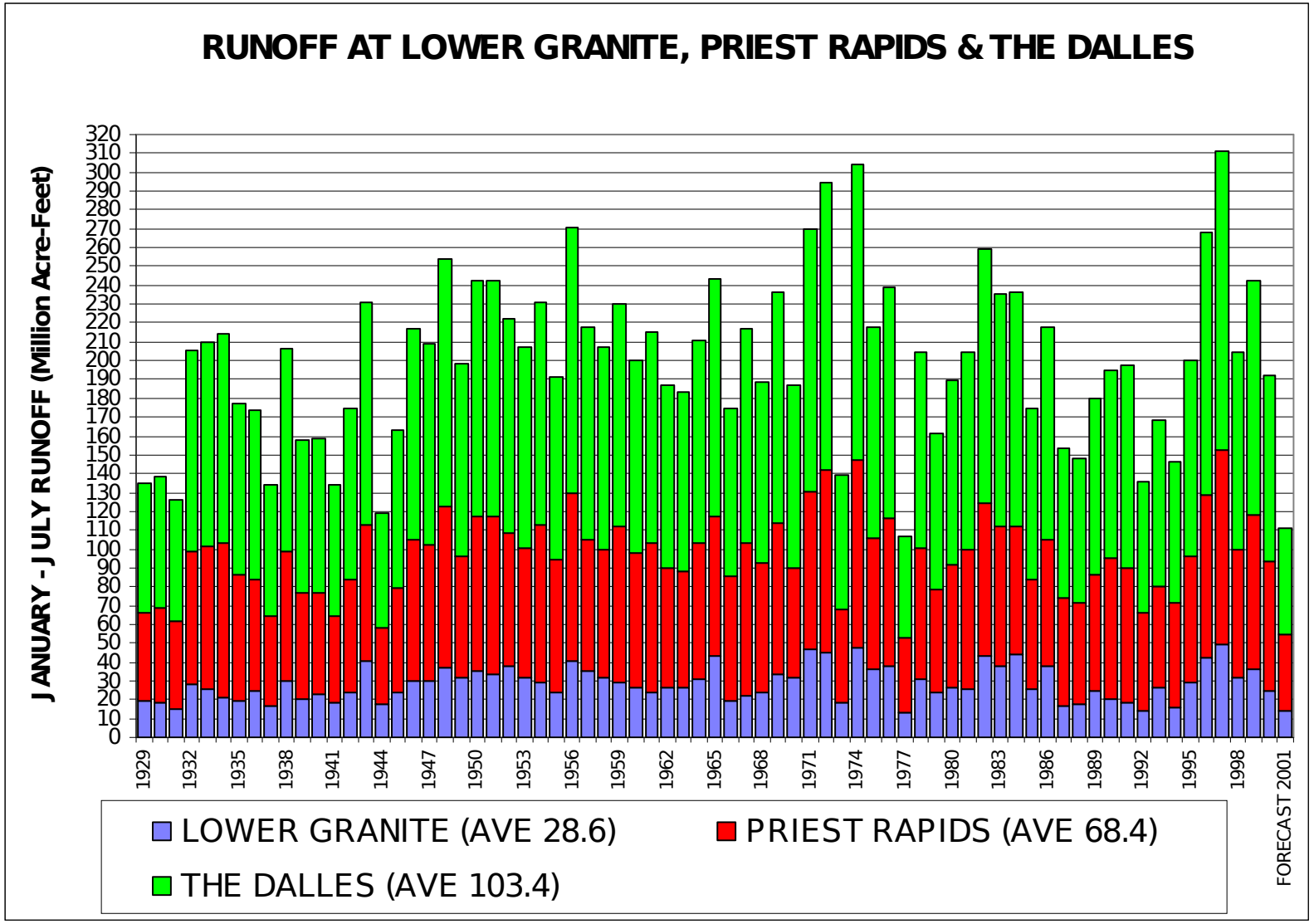
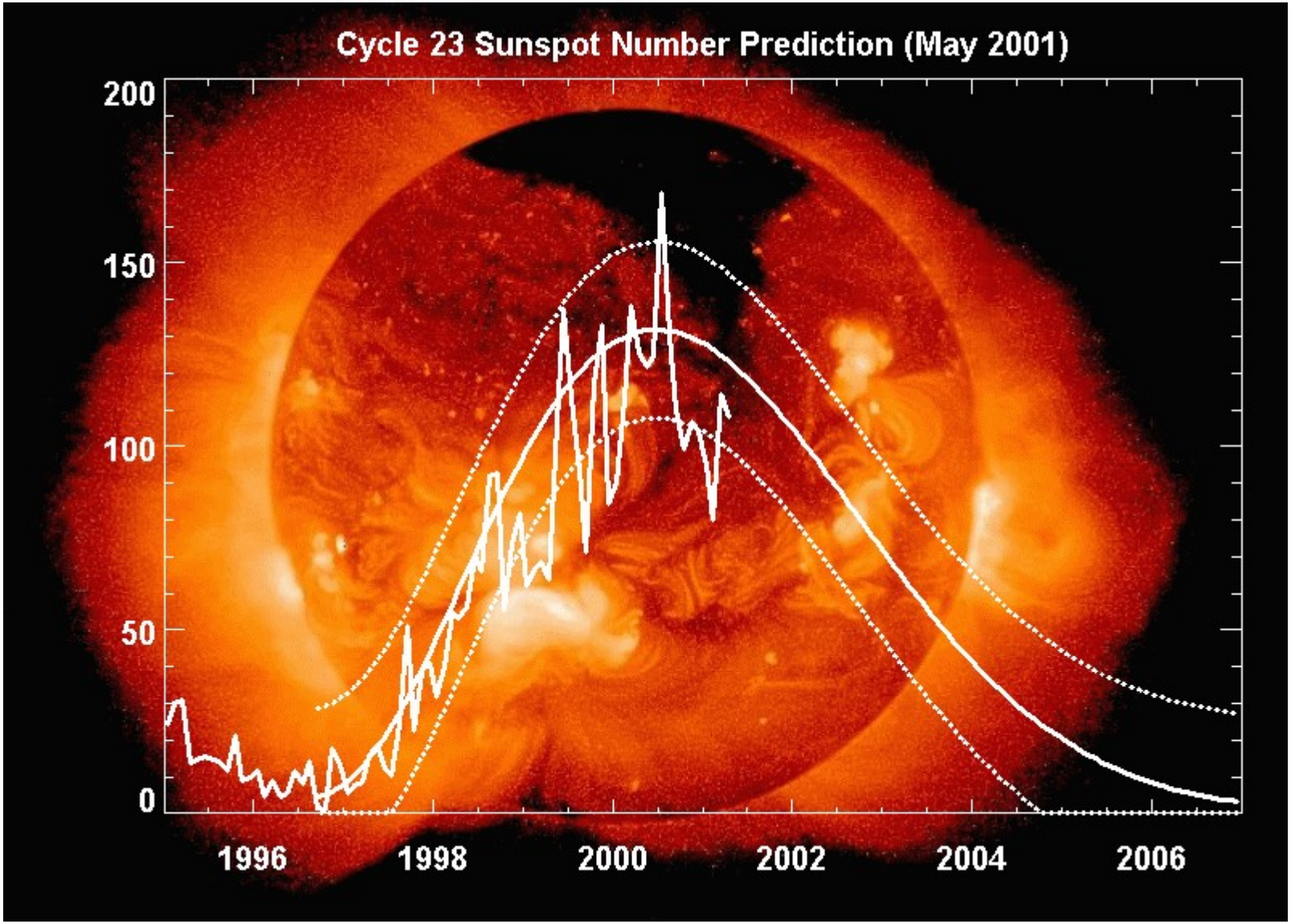
Two Years of Dryness?

- The drought began in November 2000. PNW seasonal precipitation totals have averaged 40% to 90% of normal since October 1st, 2000.
- Federal managers were advised on the drought on January 10, 2001, but ignored CRITFC input. NOAA's NCEP keeps insisting "near normal" precipitation in their climate forecasts, despite being wrong since November 2000.
- Winter reservoir levels were 10-35 feet lower than in 1977, the worst drought in 70 years.


RUNOFF AT LOWER GRANITE, PRIEST RAPIDS & THE DALLES
JANUARY - JULY RUNOFF (Million Acre-Feet)
320
310
300
290
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1929
1932
1935
1938
1941
1944
1947
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
FORECAST 2001
LOWER GRANITE (AVE 28.6)
PRIEST RAPIDS (AVE 68.4)
THE DALLES (AVE 103.4)

Cause of 2001-2002 Drought

- New research suggests that sunspot cycles can cause short-term variation in solar radiation reaching the Earth, and trigger *El Nino* events.
- Dr. Landscheidt of Nova Scotia predicted, using sunspot cycle analysis in 1998, that the next *El Nino* could start in early 2001 and peak in the summer of 2002. His paper, “Solar Activity Controls El Nino and La Nina” is located at http://www.microtech.com.au/daly/sun-enso/sun-enso.htm



(www.SunspotCycle.com)

Sunspot correlations with *El Nino* events

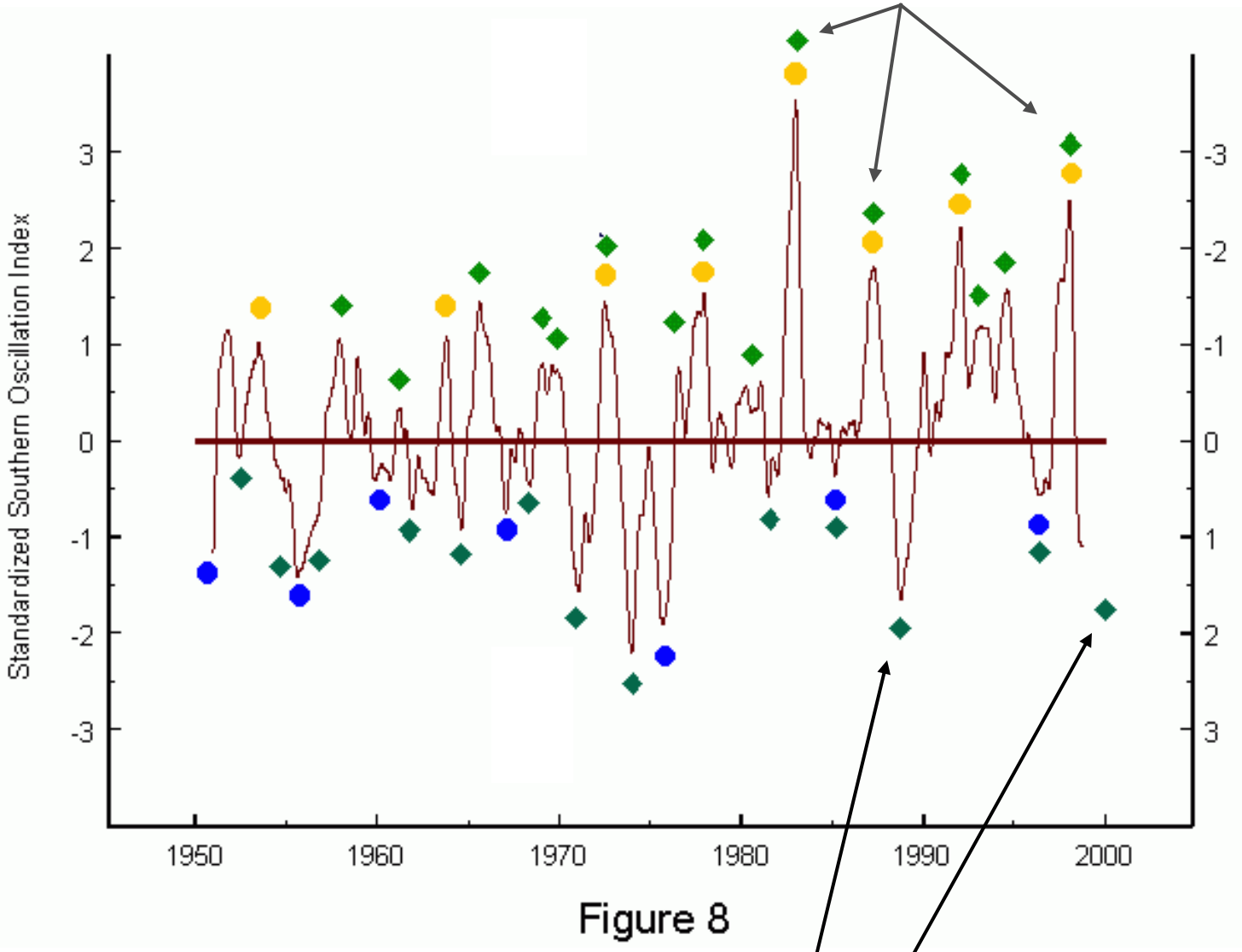
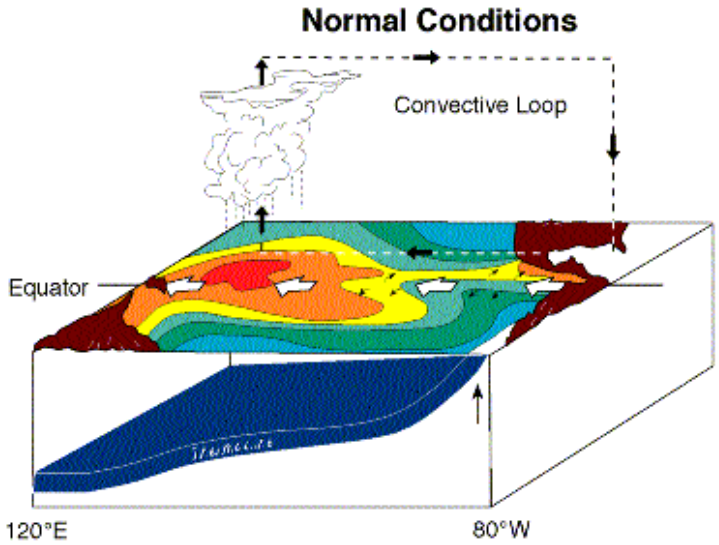
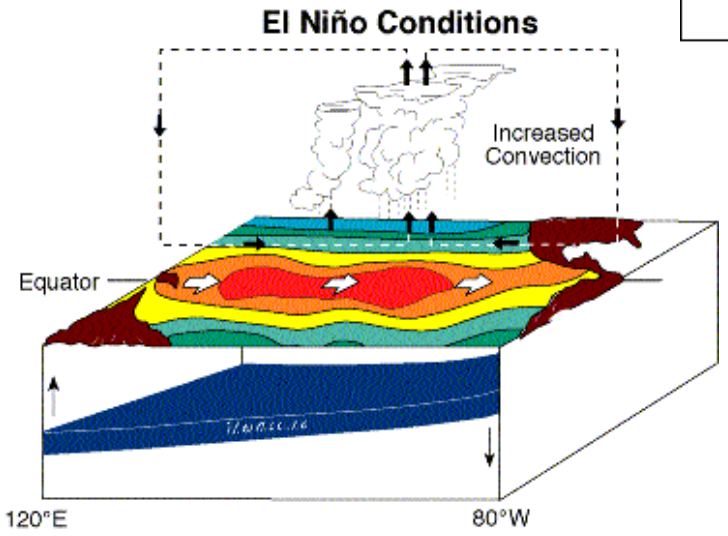


Figure 8

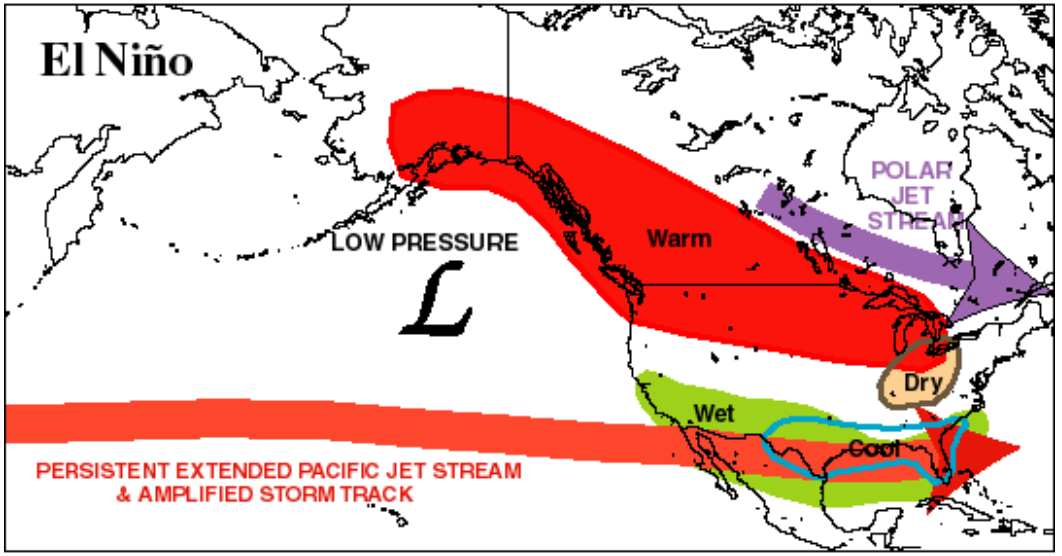
(from Landscheidt, 1998)

Sunspot correlations with *La Nina* events





NOAA/PMEL/TAO

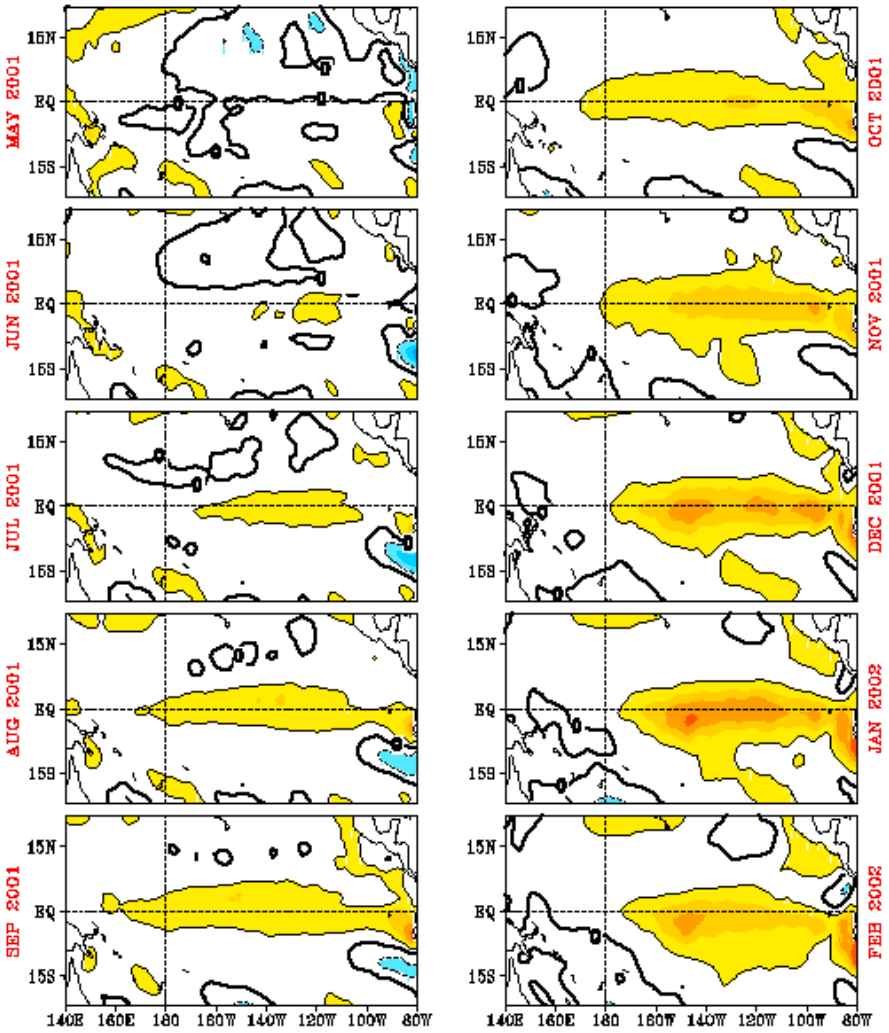


http://www.pmel.noaa.gov/toga-tao/el-nino/nino-home.html

El Nino is coming...

- A split jet stream persisted last winter. So, why the disconnect between ocean and air?
- Sunspot maxima usually occur 2-3 years before the peak of an *El Nino*. March 2000 was the last peak of sunspot maxima.
- NOAA climate researchers show that Pacific tropical water will warm by November and intensify by January 2002. Warm water will negatively impact 2002 salmon outmigrants.

FORECAST SST ANOMALIES



Last Update: Tue May 1 2001

Compare Climate Forecasts

PRECIP	NOV	DEC	JAN	FEB	MAR	APR	MAY
NCEP	Avg	Avg	Wet	Wet	Avg	Avg	Wet
CRITFC	Wet	Dry	Dry	Dry	Dry	Dry	Dry
Observed	DRY	DRY	DRY	DRY	DRY	WET	DRY

TEMP	NOV	DEC	JAN	FEB	MAR	APR	MAY
NCEP	Avg	Avg	Avg	Cold	Avg	Avg	Warm
CRITFC	Cold	Cold	Avg	Warm	Cold	Avg	Avg
Observed	COLD	COLD	AVG	COLD	AVG	COLD	WARM

Impacts to PNW rivers and salmon

- Expect persistent dry weather for two years. Precipitation will be 60 - 80% of normal.
- Low summer reservoir levels will carry over into 2002, during the peak of a warm dry *El Nino*.
- Regional power needs have driven reservoir levels down to unprecedented lows. Low flows will favor extreme hydro-power peaking.
- CRITFC advocates using water now to assist record number of returning salmon adults, knowing that reservoir levels will be impacted, and ocean conditions could sour in late 2001.

Summary

- Sunspot maxima occur 2-3 years before an *El Nino* event. Solar cycle analyses could help Federal managers better utilize Columbia basin water resources on a 1-2 year scale.
- Sea-surface temperature forecasts suggest an *El Nino* will develop this coming winter.
- Expect precipitation to be 60-80% of normal through winter 2001-2. No relief until 2003.
- Record returning salmon will face record low flow for upstream migration & spawning.